

Spot Safety Project Evaluation

Project Log # 200704275

Spot Safety Project # 01-01-247

**Spot Safety Project Evaluation of the Left Turn Lane Installation at SR 1100 (Long Ridge Rd)
and SR 1106 (Morrattuck Rd) in Washington County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

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Traffic Safety Project Engineer

3/4/2008
Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 01-01-247 – Left Turn Lane installation at SR 1100 (Long Ridge Rd) and SR 1106 (Morrattuck Rd) in Washington County.

Project Information and Background from the Project File Folder

SR 1100 and SR 1106 are both two lane roadways with speed limits of 55 mph each. The three leg intersection was controlled by a stop condition on SR 1106. SR 1106 intersects SR 1100 at a slight skew, but the roadside vegetation was trimmed for good sight distance.

The original problem statement shows high volumes of industrial truck traffic turning into and out of SR 1106. There is a potential hazard for rear end and left turn crashes along with severe damage to the pavement and shoulders from turning trucks. The improvement chosen for the subject location was to install a left turn lane southbound on SR 1100. The final completion date for the improvement at the subject location was on May 31, 2002 at a cost of \$130,000 (\$65,000 coming from spot safety funds).

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes along the subject road, the crash data omitted from this analysis to consider for an adequate construction period was from April 2002 through June 2002. The before period consisted of reported crashes from July 1, 1997 through March 31, 2002 (4 years, 9 months) and the after period consisted of reported crashes from July 1, 2002 through March 31, 2007 (4 years, 9 months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data consisted of all crashes within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the above information. Please note that Rear End and Left Turn crash types influenced by the implemented countermeasure were the target crashes for the treatment location. These crash types considered are as follows: Left Turn, same roadway, Left Turn, different roadway, Rear End, slow, stop, or turn, and Angle. The target crashes are clearly identified in the before and after period collision diagrams.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	3	1	-66.7
Total Severity Index	1.0	8.4	740.0
Target Severity Crashes	2	0	-100.0
Target Severity Index	1.0	0.0	-100.0
Volume	3700	4800	29.7
<u>Treatment Injury Crashes</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	N/A
Class A	0	0	N/A
Class B	0	1	N/A
Class C	3	0	-100.0
Property Damage Only	0	0	N/A
<u>Target Injury Crashes</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal	0	0	N/A
Class A	0	0	N/A
Class B	0	0	N/A
Class C	2	0	-100.0
Property Damage Only	0	0	N/A

Table 1.

The naive before and after analysis at the treatment location resulted in a 67 percent decrease in Total Crashes, a 100 percent decrease in Target Crashes, and a 30 percent increase in Average Daily Traffic (ADT). The before period ADT year was 1999 and the after period ADT year was 2004.

Results and Discussion

The naïve before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 67 percent decrease in Total Crashes and a 100 percent decrease in Target Crashes. The summary results above demonstrate that the treatment location appears to have had a decrease in the number of Total Crashes and a decrease in the number of Target Crashes from the before to the after period.

During the field investigation, the intersection was observed to see if turning trucks experienced any difficulty. The trucks had plenty of room to make their turns and were not riding on the edge of the pavement. Driving through the intersection there were no sight distance issues noted when maneuvering with or without trucks in the roadway.

The calculated benefit to cost ratio for this project is -0.10 considering total crashes. The benefit to cost ratio considering only target crashes is 0.12 . The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of road.

TREATMENT BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1100 at SR 1106		BY: SDC	
COUNTY: Washington		DATE: 11/1/2007	
FILE NO.: SS 01-01-247			

DETAILED COST:	TYPE IMPROVEMENT -	Left Turn Lane
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ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$130,000	20	0.102	\$13,241
	\$0	0	0.000	\$0
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$130,000	20	0.102	\$13,241

ESTIMATED INCREASE IN ANNUAL MAINT. COST =	\$400
ESTIMATED INCREASE IN ANNUAL UTILITY COST =	\$0
TOTAL ANNUAL COST=	\$13,641
TOTAL COST OF PROJECT=	\$130,000

COMPREHENSIVE COST REDUCTION:								
ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES								
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.75	0	0.00	0	0.00	3	0.63	\$2,463
AFTER	4.75	0	0.00	1	0.21	0	0.00	\$3,789

Annual Benefits from Crash Cost Savings	(\$1,326)
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NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST	=	(\$14,967)
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST	=	-0.10

TOTAL COST OF PROJECT	-	\$130,000	COMPREHENSIVE B/C RATIO	-	-0.10
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TARGET CRASH BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1100 at SR 1106
COUNTY: Washington
FILE NO.: SS 01-01-247

BY: SDC
DATE: 11/1/2007

DETAILED COST: TYPE IMPROVEMENT - Left Turn Lane

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$130,000	20	0.102	\$13,241
	\$0	0	0.000	\$0
Right-of-Way	\$0	0	0.000	\$0

TOTALS	\$130,000	20	0.102	\$13,241
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ESTIMATED INCREASE IN ANNUAL MAINT. COST =	\$400
ESTIMATED INCREASE IN ANNUAL UTILITY COST =	\$0
TOTAL ANNUAL COST=	\$13,641
TOTAL COST OF PROJECT=	\$130,000

COMPREHENSIVE COST REDUCTION:

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES						ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	
BEFORE	4.75	0	0.00	0	0.00	2	0.42	\$1,642
AFTER	4.75	0	0.00	0	0.00	0	0.00	\$0

Annual Benefits from Crash Cost Savings	\$1,642
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NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST	=	(\$11,999)
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST	=	0.12

TOTAL COST OF PROJECT	-	\$130,000	COMPREHENSIVE B/C RATIO	-	0.12
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Treatment Site Photos taken October 24, 2007



Driving north on SR 1100



Driving north on SR 1100



Driving south on SR 1100



Driving west on SR 1106

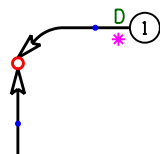
Washington County
Treatment Site - Total Crashes
After Period
July 1, 2002 - March 31, 2007
(4 years, 9 months)



SR 1100
55 MPH



SR 1106
55 MPH



LEGEND

	single-lane road		T-intersection		P pedestrian
	two-lane road		Y-intersection		B bicycle
	three-lane road		roundabout		T train
	four-lane road		grade-separated crossing		A animal
	five-lane road		at-grade crossing		OTHER AT FAULT
	six-lane road		railroad crossing		D deer
	seven-lane road		highway exit		W wet
	eight-lane road		highway interchange		I ice
	nine-lane road		highway interchange		
	ten-lane road		highway interchange		
	eleven-lane road		highway interchange		
	twelve-lane road		highway interchange		
	thirteen-lane road		highway interchange		
	fourteen-lane road		highway interchange		
	fifteen-lane road		highway interchange		
	sixteen-lane road		highway interchange		
	seventeen-lane road		highway interchange		
	eighteen-lane road		highway interchange		
	nineteen-lane road		highway interchange		
	twenty-lane road		highway interchange		

Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT		COLLISION DIAGRAM	
HIGHWAY SAFETY IMPROVEMENT PROGRAM		SAFETY INFORMATION	
		Division:	Area:
		STUDY PERIOD: 7/1/2002 TO 3/31/2007	
		DISTANCE: 1-MILE 150 FT	
		ANALYSIS PREPARED BY: S. CORREIA	
DIAGRAM PREPARED BY: S. CORREIA		DATE: MARCH 2007	
DIAGRAM REVIEWED BY:		LOC NUMBER:	
SAFETY EVALUATION		TRAFFIC SAFETY	
DETER. LEEI. TURN. LANE		SCALE: NOT TO SCALE	
INSTALLATION		DATE: MARCH 2007	
N.C. DEPARTMENT of TRANSPORTATION DIVISION of HIGHWAYS TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH			